# EPSY 6637 Assignment #1 Fall 2024

*This assignment is due on Monday September 9th.*

1) In the week 2 workspace there is a dataset called **astro**. It contains correct and incorrect responses from a 27 question astronomy exam.

a) Calculate the alpha for the test. Explain what it signifies.

b) Calculate the standard error of measurement.

c) Give a 95% confidence interval for a person who scored 22 out of 27.

d) Study the list of item-total correlations. Are there any problematic items on the test? What would you recommend?

e) Make a correlation matrix of the items 17, 18 and 19. An IRT analysis of these data would assume conditional independence of the items. Does the correlation matrix of these three items contradict the conditional independence assumption? Explain.

f) Make the tetrachoric correlation matrix for three items (17,18,19).

g) Make a plot of the eigenvalues for the whole test. Is the plot consistent with the assumption of unidimensionality that would be part of an IRT analysis?

2) The following questions are about the ICC curves for common IRT Models.

a) Given the 2PL model, calculate probability of a correct response if θ = -1.5, and b = -1, and a = 1.2.

b) Plot the ICC for an item with b = 1.0, a = 1.5. Also plot another curve for an item that is easier but has a steeper discrimination.

c) Suppose a test had 20 items, and the b parameters were greater than 0 for all the items? What could you say about the properties of the test?